REMARKS

Applicant respectfully requests reconsideration and allowance of the subject application. Claims 1-57 are pending in this application.

Claim Amendments

Claims 1-4, 40-43, 45, and 49-51 are currently amended.

No new claims are added.

No claims are cancelled.

Informal Objection to Claims

Claims 45, 49, and 51 were informally objected to as having embedded numbers within the claims. The Patent Office cites no provision of the patent statute or the C.F.R. in making the objection, so the informalities are not related to patentability. The embedded numbers have been removed or unembedded. These are not narrowing amendments and do not narrow the scope of the claims.

Rejection of the Claims

Rejections under 35 USC § 102(b)

Claims 1-34 and 40-57 were rejected under 35 USC § 102(b) as being anticipated by U.S. Patent No. 5,572,423 to Church ("Church" or "the Church reference"). Under 102(b), "[A] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987). Thus, to be a prior art reference under 35 USC § 102(b), a prior art patent or other publication must bear within its four corners adequate directions for the practice of the patent invalidated. If

the earlier disclosure does not inform how to practice the new subject matter it does not anticipate the claimed subject matter. Anticipation under 35 U.S.C. § 102(b) requires that each and every element of the claimed subject matter, as arranged in the claim, be disclosed either specifically or inherently by a single prior art reference. (For example, see Minnesota Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 1565 (Fed.Cir.1992); Scripps, 927 F.2d at 1576-77; Lindemann Maschinenfabrik GMBH, v. American Hoist & Derrick Co., 730 F.2d 1452, 1458 (Fed.Cir.1984)).

Claim 1

Claim 1 has been amended to more particularly point out and distinctly claim the subject matter. The amendments are not narrowing amendments that add limitation to claim 1, but instead add clarity.

Applicants' claim 1 as amended recites:

> A method comprising:
> receiving an entered string; and
> determining how likely a word was to have been entered as the string based on at least one edit operation that converts one of multiple character sequences of arbitrary length in the word to one of multiple character sequences of arbitrary length in the string.

The method of claim 1 recites converting *one of multiple* character sequences of arbitrary length in a word to *one of multiple* character sequences of arbitrary length in an entered string. Applicants' specification describes:

> "*the error model 44 partitions the word w and string s into different numbers of segments that define varying lengths of character sequences*. For example, suppose the dictionary word is "physical" and the number of partition segments is five. One possible partition is, say,

"ph y s ic al". (Applicants' specification, page 9, lines 16-19; emphasis added.)

In other words, in one implementation, Applicants' subject matter partitions an entered string and a candidate word, each into multiple character sequences of various arbitrary lengths. The relative merit of the partitioning for finding a word likely to be the word that the user intended—but mistyped—is then weighed. Next, Applicants' methods partition the entered string and the candidate word differently into a different combination of multiple character sequences of arbitrary lengths and weighs the relative merit of this new partitioning. The process of partitioning the string and the word different ways and weighing the relative merit of each way is typically repeated many times. (See Table 1 on page 11 of Applicants' specification.) The partitioning with the highest merit can be selected for comparison with the best partitioning merits of other candidate words.

The Church reference does not expressly or inherently describe the entire subject matter of claim 1, that is, does not describe using multiple character sequences in a word and in a string to determine how likely the word was to have been entered as the string. Specifically, the Church reference does not describe determining how likely a word was to have been entered as the string based on at least one edit operation that converts one of multiple character sequences of arbitrary length in the word to one of multiple character sequences of arbitrary length in the string.

Since the Church reference does not expressly or inherently describe the entire subject matter of claim 1, Applicants respectfully request that the 35 USC § 102(b) rejection be removed. Applicants further suggest that claim 1 is in condition for allowance.

Claims 2-9

Claims 2-4 have been amended to more particularly point out and distinctly claim the subject matter. Claims 5-9 have not been amended. The amendments to claims 2-4 are not narrowing amendments.

For at least the reasons set forth above with respect to claim 1, Applicants submit that claims 2-9 are patentable over the Church reference. Dependent claims contain the language of the claims from which they depend. Claims 2-9 depend from claim 1. Therefore, claims 2-9 are also allowable.

Claim 10

Independent claim 10 recites:

A method comprising:
receiving an entered string *s*; and
determining a probability P(*s*|*w*) expressing how likely a word *w* was to have been incorrectly entered as the string *s* based on one or more edit operations that convert first arbitrary-length character sequences α_1, α_2, α_3, ..., α_n in the word *w* to corresponding second arbitrary-length character sequences β_1, β_2, β_3, ..., β_n in the string *s*, wherein:

$$P(s|w) = P(\beta_1|\alpha_1) * P(\beta_2|\alpha_2) * P(\beta_3|\alpha_3) *\ldots *P(\beta_n|\alpha_n)$$

Church does not expressly or inherently describe the entire subject matter of claim 10, that is, does not describe determining a probability based on one or more edit operations that convert multiple arbitrary-length sequences in a word to corresponding multiple arbitrary-length sequences in an entered string as recited by claim 10.

The same reasoning applies as discussed above with respect to claim 1. Since the Church reference does not expressly or inherently describe the entire

subject matter of claim 10, Applicants respectfully request that the 35 USC § 102(b) rejection be removed. Applicants further suggest that claim 10 is in condition for allowance.

Claims 11-16

For at least the reasons set forth above with respect to claim 10, Applicants submit that claims 11-16 are patentable over the Church reference. Dependent claims contain the language of the claims from which they depend. Claims 11-16 depend from claim 10. Therefore, claims 11-16 are also allowable.

Claim 17

Independent claim 17 recites:

A method, comprising:
receiving an entered string *s*; and
determining a probability P(*s*|*w*) expressing how likely a word *w* was to have been incorrectly entered as the string *s*, by partitioning the word w and the string s and computing probabilities for various partitionings, as follows:

$$P(s \mid w) = \sum_{R \in Part(w)} P(R \mid w) \sum_{\substack{T \in Part(s) \\ |T|=|R|}} \prod_{i=1}^{|R|} P(T_i \mid R_i)$$

where Part(*w*) is a set of possible ways of partitioning the word *w*, Part(*s*) is a set of possible ways of partitioning the string *s*, R is a particular partition of the word *w*, and T is a particular partition of the string *s*.

Church does not expressly or inherently describe the entire subject matter of claim 17, that is, Church does not describe determining a probability expressing how likely a word was to have been incorrectly entered as a string by partitioning the word and the string and computing probabilities for various

partitionings. Applicants note the Patent Office's assessment that Church "does not explicitly disclose partitioning of the probability function in the misspelled word and candidate word" (Office Action of September 26, 2003, section 4, "Regarding independent claim 17...")

In addition, the same reasoning applies as discussed above with respect to claims 1 and 10. Since the Church reference does not expressly or inherently describe the entire subject matter of claim 17, Applicants respectfully request that the 35 USC § 102(b) rejection be removed. Applicants further suggest that claim 17 is in condition for allowance.

Claims 18-22

For at least the reasons set forth above with respect to claim 17, Applicants submit that claims 18-22 are patentable over the Church reference. Dependent claims contain the language of the claims from which they depend. Claims 18-22 depend from claim 17. Therefore, claims 18-22 are also allowable.

Claim 23

Applicants' claim 23 recites:

A method comprising:
receiving an entered string *s*; and
determining a probability P(*s*|*w*) expressing how likely a word *w* was to have been incorrectly entered as the string *s*, by partitioning the word w and the string s and computing probabilities for various partitionings, as follows:

$$P(s|w) = \max_{R \in Part(w),\, T \in Part(s)} P(R|w) * \prod_{i=1}^{|R|} P(T_i|R_i)$$

where Part(*w*) is a set of possible ways of partitioning the word *w*, Part(*s*) is a set of possible ways of partitioning the string *s*, R is a particular partition of the word *w*, and T is a particular partition of the string *s*.

Church does not expressly or inherently describe the entire subject matter of claim 23, that is, does not describe determining a probability expressing how likely a word was to have been incorrectly entered as an entered string, by partitioning the word and the string and computing probabilities for various partitionings.

Applicants note with the Patent Office's assessment that Church "does not explicitly disclose partitioning the word, where "T" is a particular partitioning of a string, and computing probabilities for various partitionings" (Office Action of September 26, 2003, section 4, "Regarding independent claim 23...")

In addition, the same reasoning applies as discussed above with respect to claims 1, 10, and 17. Since the Church reference does not expressly or inherently describe the entire subject matter of claim 23, Applicants respectfully request that the 35 USC § 102(b) rejection be removed. Applicants further suggest that claim 23 is in condition for allowance.

Claims 24-29

For at least the reasons set forth above with respect to claim 23, Applicants submit that claims 24-29 are patentable over the Church reference. Dependent claims contain the language of the claims from which they depend. Claims 24-29 depend from claim 23. Therefore, claims 24-29 are also allowable.

Claim 30

Applicants' claim 30 recites:

A method comprising:
receiving an entered string *s*; and
determining a probability P(*s*|*w*) expressing how likely a word *w* was to have been incorrectly entered as the string *s*, by partitioning the word w and the string s and finding a partition R of the word w and a partition T of the string s such that $\prod_{i=1}^{|R|} P(T_i \mid R_i)$ is maximized.

Church does not expressly or inherently describe the entire subject matter of claim 30, that is, does not describe determining a probability expressing how likely a word was to have been incorrectly entered as a string, by partitioning the word and the string and finding a partition R of the word and a partition T of the string such that

$\prod_{i=1}^{|R|} P(T_i \mid R_i)$ is maximized.

In addition, the same reasoning applies as discussed above with respect to claims 1, 10, 17, and 23. Since the Church reference does not expressly or inherently describe the entire subject matter of claim 30, Applicants respectfully request that the 35 USC § 102(b) rejection be removed. Applicants further suggest that claim 30 is in condition for allowance.

Claims 31-34

For at least the reasons set forth above with respect to claim 30, Applicants submit that claims 31-34 are patentable over the Church reference. Dependent claims contain the language of the claims from which they depend. Claims 31-34 depend from claim 30. Therefore, claims 31-34 are also allowable.

Claim 40

Claim 40 has been amended to more particularly point out and distinctly claim the subject matter. The amendments to claim 40 are not narrowing amendments, but instead add clarity.

Applicants' claim 40 as amended recites:

> A program embodied on a computer readable medium, which when executed, directs a computer to perform the following:
> receive an entered string; and
> determine how likely an expected string was to have been entered as the entered string based on at least one edit operation that converts one of multiple character sequences of arbitrary length in the expected string to one of multiple character sequences of arbitrary length in the entered string.

The method of claim 40 recites converting *one of multiple* character sequences of arbitrary length in the expected string to *one of multiple* character sequences of arbitrary length in the entered string.

The Church reference does not expressly or inherently describe the entire subject matter of claim 40, that is, does not describe using multiple character sequences in an expected string and in an entered string to determine how likely the expected string was to have been entered as the string. Specifically, the Church reference does not disclose, teach, or suggest determining how likely an expected string was to have been entered as the entered string based on at least one edit operation that converts one of multiple character sequences of arbitrary length in the expected string to one of multiple character sequences of arbitrary length in the entered string.

In addition, the same reasoning applies as discussed above with respect to claim 1. Since the Church reference does not expressly or inherently describe the entire subject matter of claim 40, Applicants respectfully request

that the 35 USC § 102(b) rejection be removed. Applicants further suggest that claim 40 is in condition for allowance.

Claims 41-48

Claims 41-43 have been amended to more particularly point out and distinctly claim the subject matter. The amendments to claims 41-42 are not narrowing amendments. Claims 44 and 46-48 have not been amended. Claim 45 was amended as discussed above to overcome an informal objection.

For at least the reasons set forth above with respect to claim 40, Applicants submit that claims 41-48 are patentable over the Church reference. Dependent claims contain the language of the claims from which they depend. Claims 41-48 depend from claim 40. Therefore, claims 41-48 are also allowable.

Claim 49

Claim 49 has been amended to more particularly point out and distinctly claim the subject matter. Amendments to claim 49 are not narrowing amendments, but instead add clarity. Claim 49 was also amended to overcome an informal objection, as discussed above.

Applicants' claim 49 as amended recites:

A program embodied on a computer readable medium, which when executed, directs a computer to perform the following:
(a) receive an entered string *s*;
(b) for multiple words *w* in a dictionary, determine:
how likely a word *w* in a dictionary is to have been generated, P(*w*|*context*); and
how likely the word *w* was to have been entered as the string *s*, P(*s*|*w*), based on at least one edit operation that converts one of multiple character sequences of arbitrary length in the word to

one of multiple character sequences of arbitrary length in the string; and

(c) maximize P(*s*|*w*)*P(*w*|*context*) to identify which of the words is most likely the word intended when the string s was entered.

The Church reference does not expressly or inherently describe the entire subject matter of claim 49, for example, does not describe determining how likely a word was to have been entered as a string based on at least one edit operation that converts one of multiple character sequences of arbitrary length in the word to one of multiple character sequences of arbitrary length in the string.

Since the Church reference does not expressly or inherently describe the entire subject matter of claim 23, Applicants respectfully request that the 35 USC § 102(b) rejection be removed. Applicants further suggest that claim 49 is in condition for allowance.

Claims 50-53

Claims 50-51 have been amended to overcome an informal objection, as discussed above. The amendments to claims 50-51 were not narrowing amendments. Claims 52-53 have not been amended.

For at least the reasons set forth above with respect to claim 49, Applicants submit that claims 50-53 are patentable over the Church reference. Dependent claims contain the language of the claims from which they depend. Claims 50-53 depend from claim 49. Therefore, claims 50-53 are also allowable.

Claim 54

Applicants' claim 54 recites:

A spell checker comprising:
a source model component to determine how likely a word *w* in a dictionary is to have been generated; and
an error model component to determine how likely the word *w* was to have been incorrectly entered as the string *s* based on arbitrary length string-to-string transformations.

The Church reference does not expressly or inherently describe the entire subject matter of claim 54, that is, does not describe determining how likely a word was to have been incorrectly entered as a string based on arbitrary length string-to-string transformations. As discussed above with respect to claim 1, Applicants' specification discloses:

> "*the error model 44 partitions the word w and string s into different numbers of segments that define varying lengths of character sequences*. For example, suppose the dictionary word is "physical" and the number of partition segments is five. One possible partition is, say, "ph y s ic al". (Applicants' specification, page 9, lines 16-19; emphasis added.)

Since the Church reference does not expressly or inherently describe the entire subject matter of claim 54, Applicants respectfully request that the 35 USC § 102(b) rejection be removed. Applicants further suggest that claim 54 is in condition for allowance.

Claims 55-57

For at least the reasons set forth above with respect to claim 54, Applicants submit that claims 55-57 are patentable over the Church reference. Dependent claims contain the language of the claims from which they depend.

Claims 55-57 depend from claim 54. Therefore, claims 55-57 are also allowable.

Rejections under 35 USC § 103(a)

Claims 35-39 were rejected as being unpatentable over U.S. Patent No. 6,131,102 to Potter ("Potter" or "the Potter reference") in view of the Church reference. The Patent Office has not established a prima facie case of obviousness because Church does not disclose, teach or suggest alone or in combination with the Potter reference, the subject matter of claim 35, in particular the collapsing any contiguous non-match edits into one or more common error regions, each error region containing one or more characters that can be converted to one or more other characters using a substitution edit.

Applicants' claim 35 recites:

A method for training an error model used in a spell checker, comprising:

determining, given a <wrong, right> training pair and multiple single character edits that convert characters in one of the right or wrong strings to characters in the other of the right or wrong strings at differing costs, an alignment of the wrong string and the right string that results is a least cost to convert the characters;

collapsing any contiguous non-match edits into one or more common error regions, each error region containing one or more characters that can be converted to one or more other characters using a substitution edit; and

computing a probability for each substitution edit.

Applicants note that the Patent Office characterizes Potter as using "multiple single character edits" and states that Potter does not explicitly disclose "collapsing any contiguous non-match edits into one or more common error regions, each error region containing one or more characters that can be converted to one or more other characters using a substitution edit; and

computing a probability for each substitution edit." (Office Action of September 26, 2003, section 4, "Regarding independent claim 35 ...")

Moreover, the Patent Office characterizes Table D of the Church reference as disclosing "computing a probability for each substitution edit" (Idem.) But Church does not disclose, teach or suggest alone or in combination with the Potter reference, the subject matter of claim 35, in particular, collapsing any contiguous non-match edits into one or more common error regions, each error region containing one or more characters that can be converted to one or more other characters using a substitution edit; and computing a probability for each substitution edit, as recited in claim 35. Thus, neither Potter nor Church singly or in combination suggest a method for training an error model to use substitution of entire character sequences of arbitrary length within strings and words, e.g., "ct" for "kgs"; "act" for "akgs"; "actu" for "akgsu"; "ctu" for "kgsu"; "ctua" for "kgsua"; etc. (Applicants' specification, pages 16-17.)

Assuming arguendo that a motivation to combine the references existed, the Potter and Church references do not suggest a training mechanism that can use character sequences of arbitrary length for a single substitution because both Potter and Church rely on single character edits. But the Patent Office also presents no evidence of motivation to combine Potter and Church to arrive at Applicants' subject matter. There would be no motivation to combine Potter's single character edits with Church's probabilities for single character edits to arrive at, for example, Applicants':

> . . . collapsing any contiguous non-match edits into one or more common error regions, each error region containing one or more characters that can be converted to one or more other characters using a substitution edit . . .

Applicants therefore respectfully submit that the 35 USC § 103(a) rejection is traversed and that claim 35 is patentable and nonobvious over Potter in view of Church and is therefore in condition for allowance.

Claims 36-39

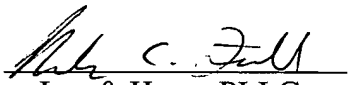
For at least the reasons set forth above with respect to claim 35, Applicants submit that claims 36-39 are also nonobvious and patentable over the Potter reference in view of the Church reference. Dependent claims contain the language of the claims from which they depend. Claims 36-39 depend from claim 35. Therefore, claims 36-39 are also allowable.

CONCLUSION

Applicant respectfully suggests that claims 1-57 are in condition for allowance. Applicant respectfully requests reconsideration and issuance of the subject application. Should any matter in this case remain unresolved, the undersigned attorney respectfully requests a telephone conference with the Examiner to resolve any such outstanding matter.

Respectfully Submitted,

Date: 1-16-04

By: 

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